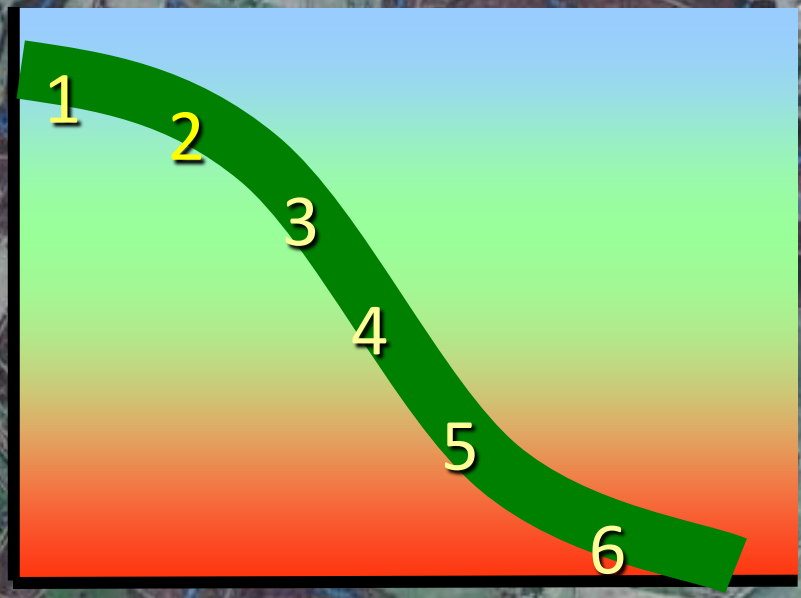
Biological Condition Gradient

Update

MWCOG
November 16, 2015



Jenny St. John
Ken Mack

DEPARTMENT OF
ENVIRONMENTAL
PROTECTION
MONTGOMERY COUNTY • MARYLAND

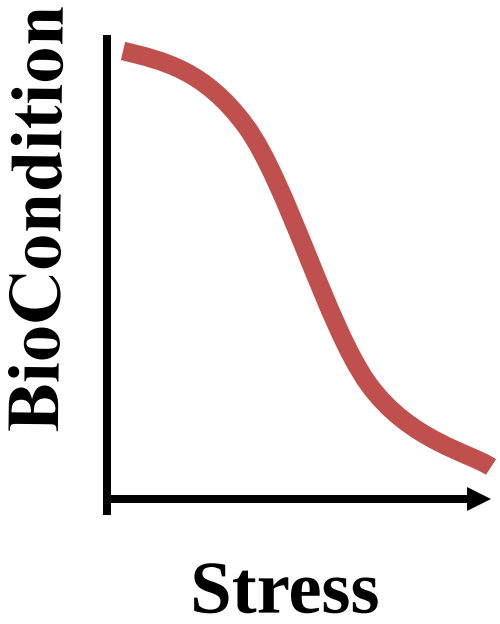
AGENDA

- What is the BCG?
- How was the BCG developed?
- How will we use the BCG?
- How do the BCG & IBI compare?
- Conclusions

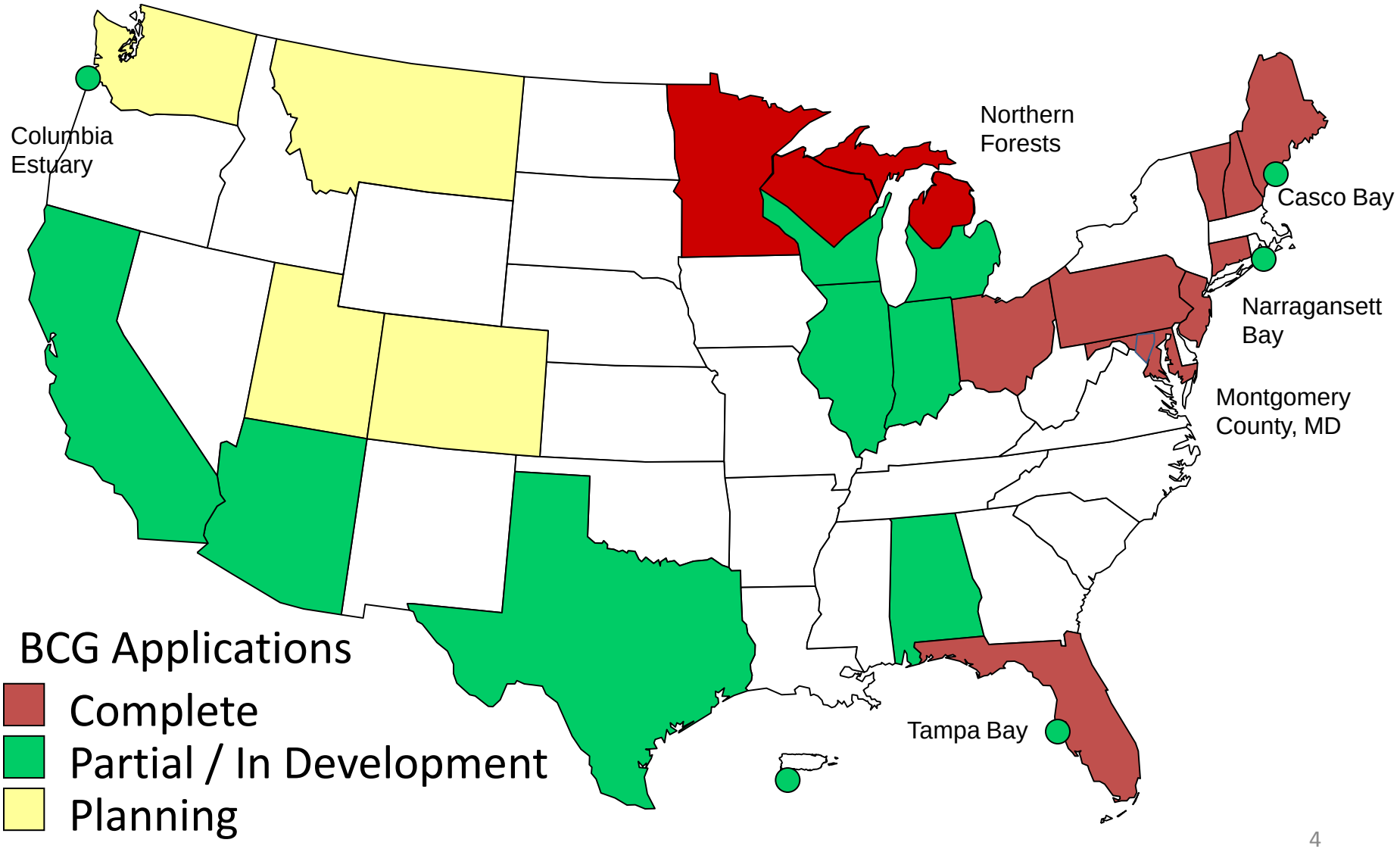
What is the BCG?

The *Biological Condition Gradient* is a scientific framework for determining biological response to anthropogenic stress

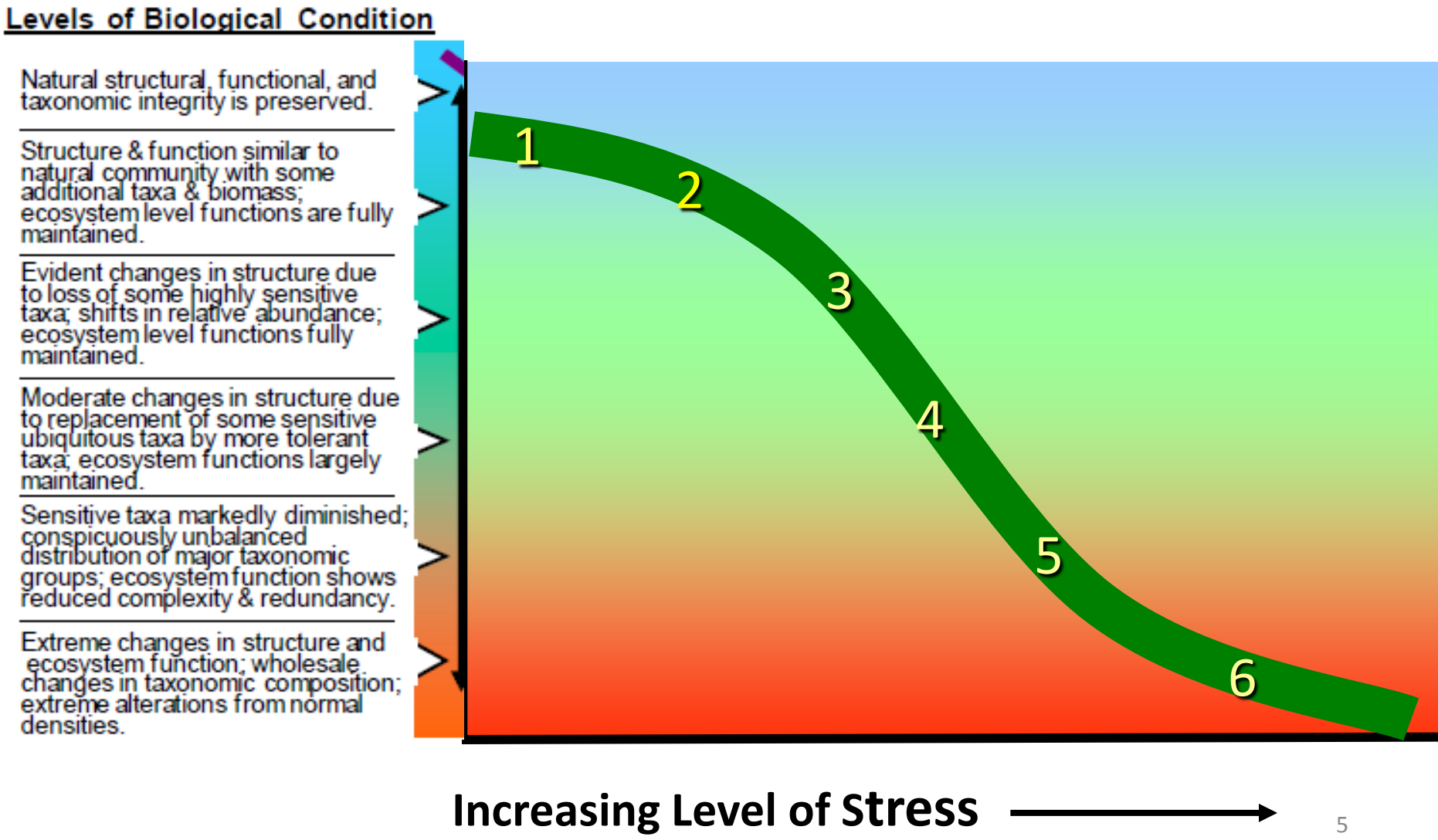
- Longstanding, accepted science
- Measurable and predictable
- Based on biological data
- Allows for regionwide assessments & comparisons on a level playing field
- Must be calibrated by region, stream class
- Provides an effective means to communicate biological conditions to resource managers & the public



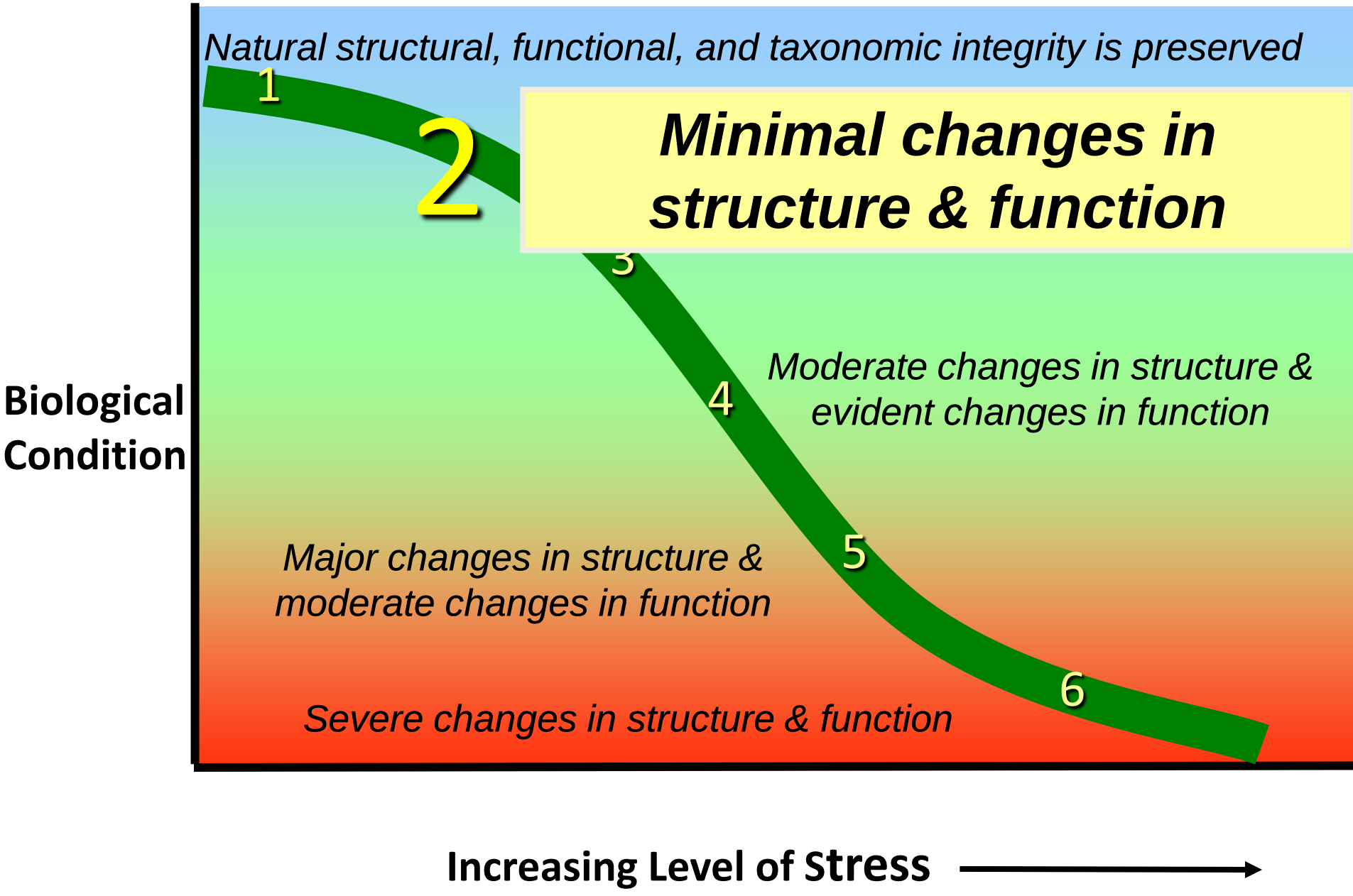
What is the BCG?



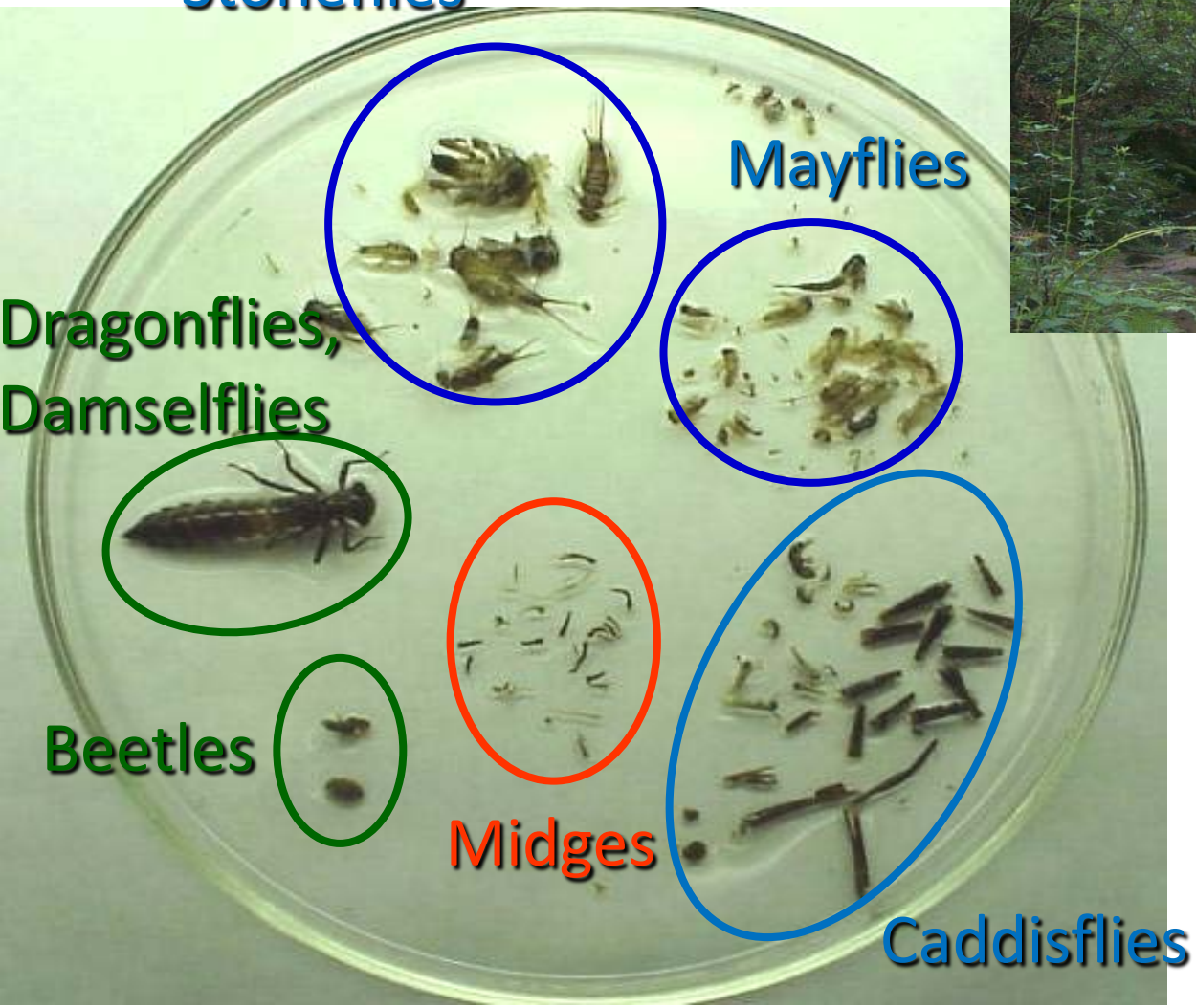
What is the BCG?



Example BCG LEVEL 2



BCG Level 2



Undisturbed/Minimally Disturbed Stream

Sensitive Organisms in Montgomery County's Headwater Streams

Mayflies

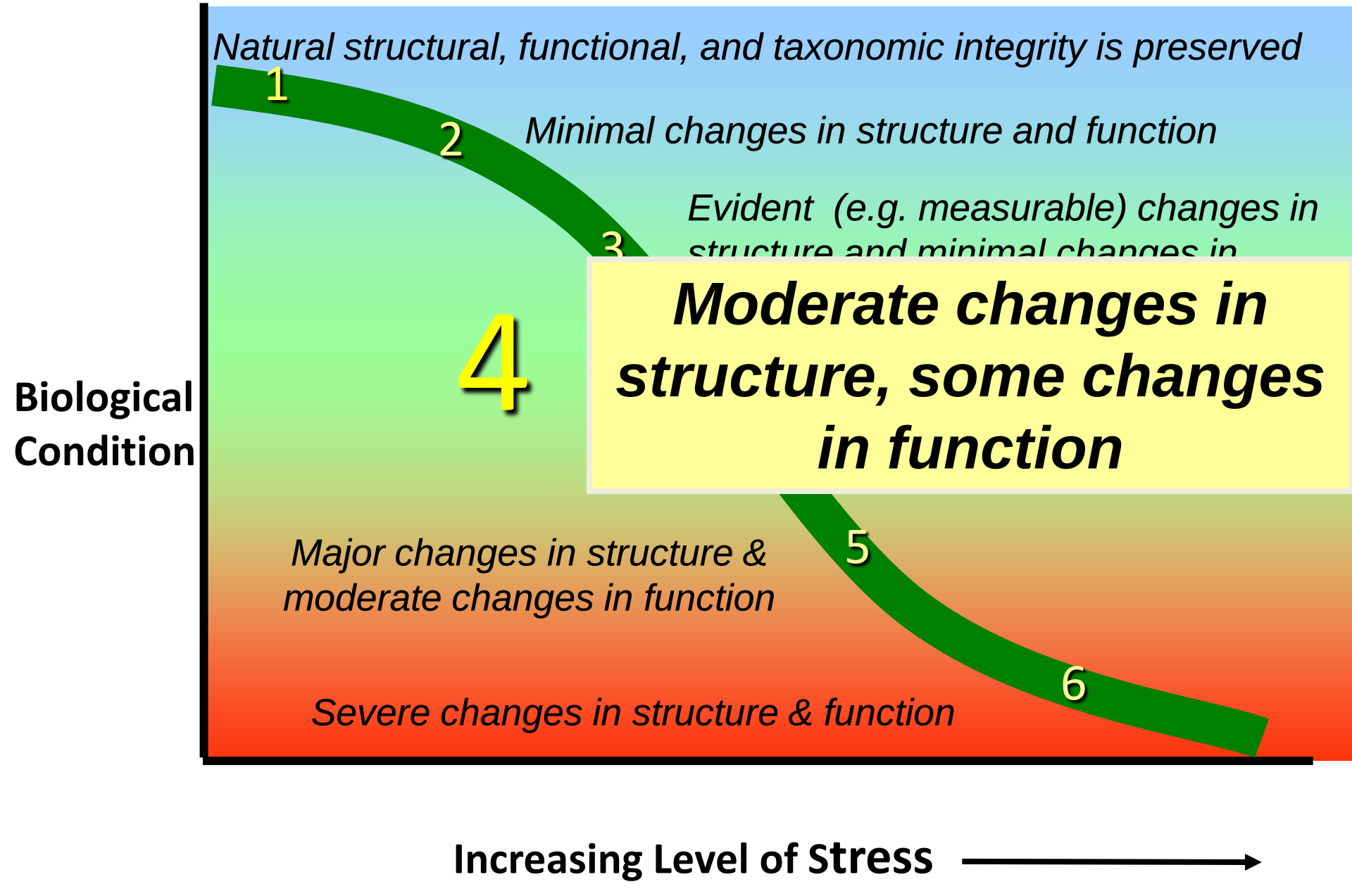
Stoneflies

Caddisflies

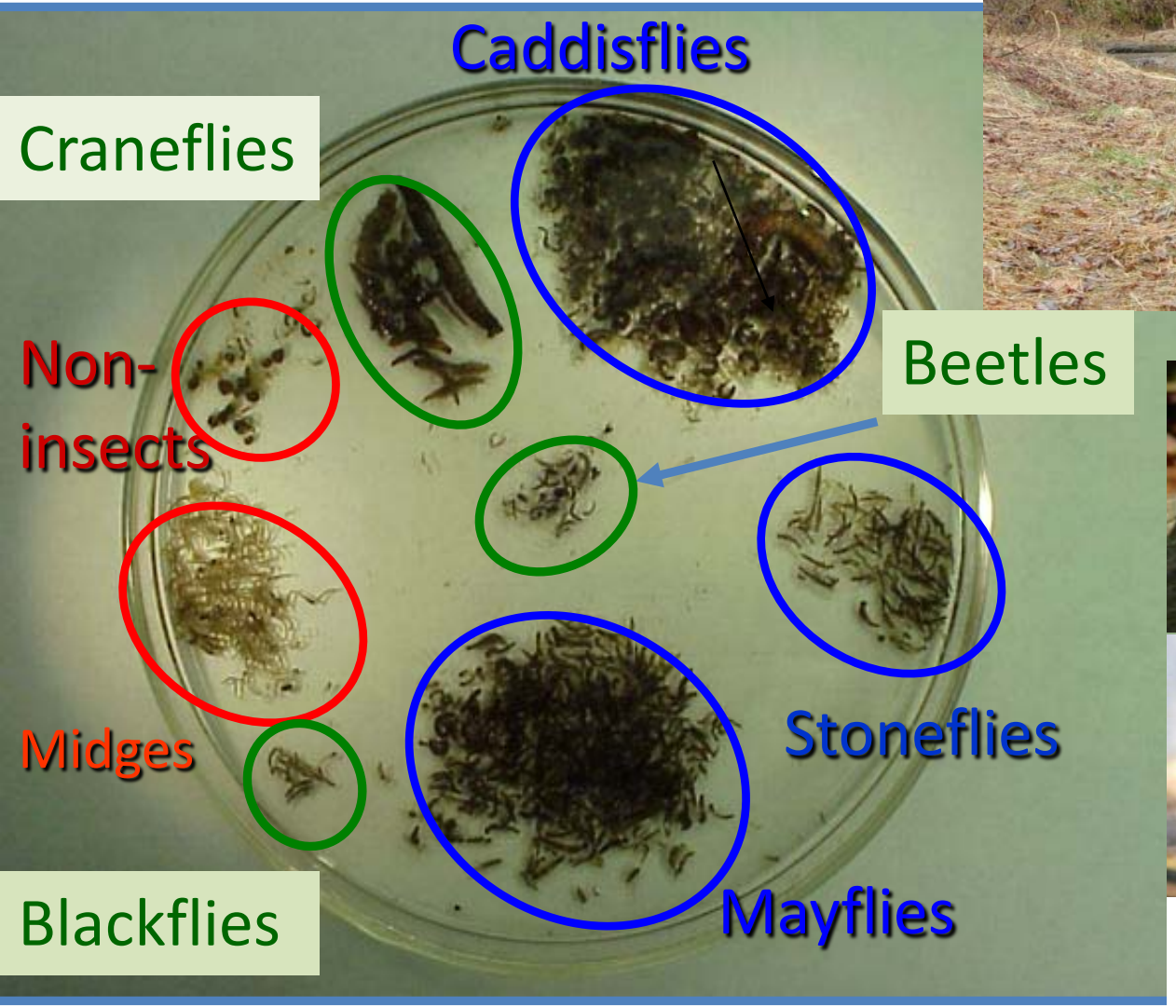
Trout and Sculpins

Salamanders

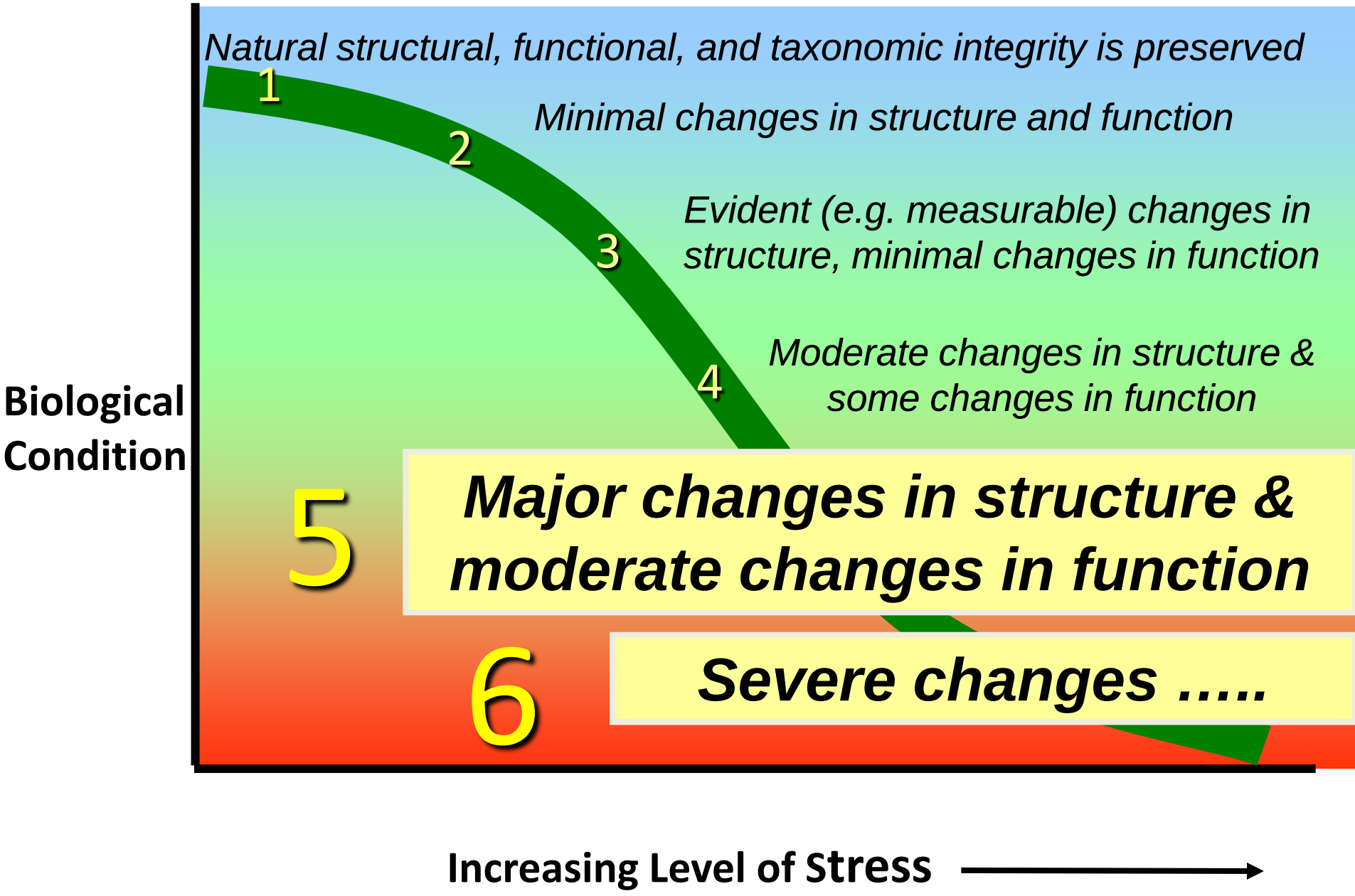
Example BCG LEVEL 4



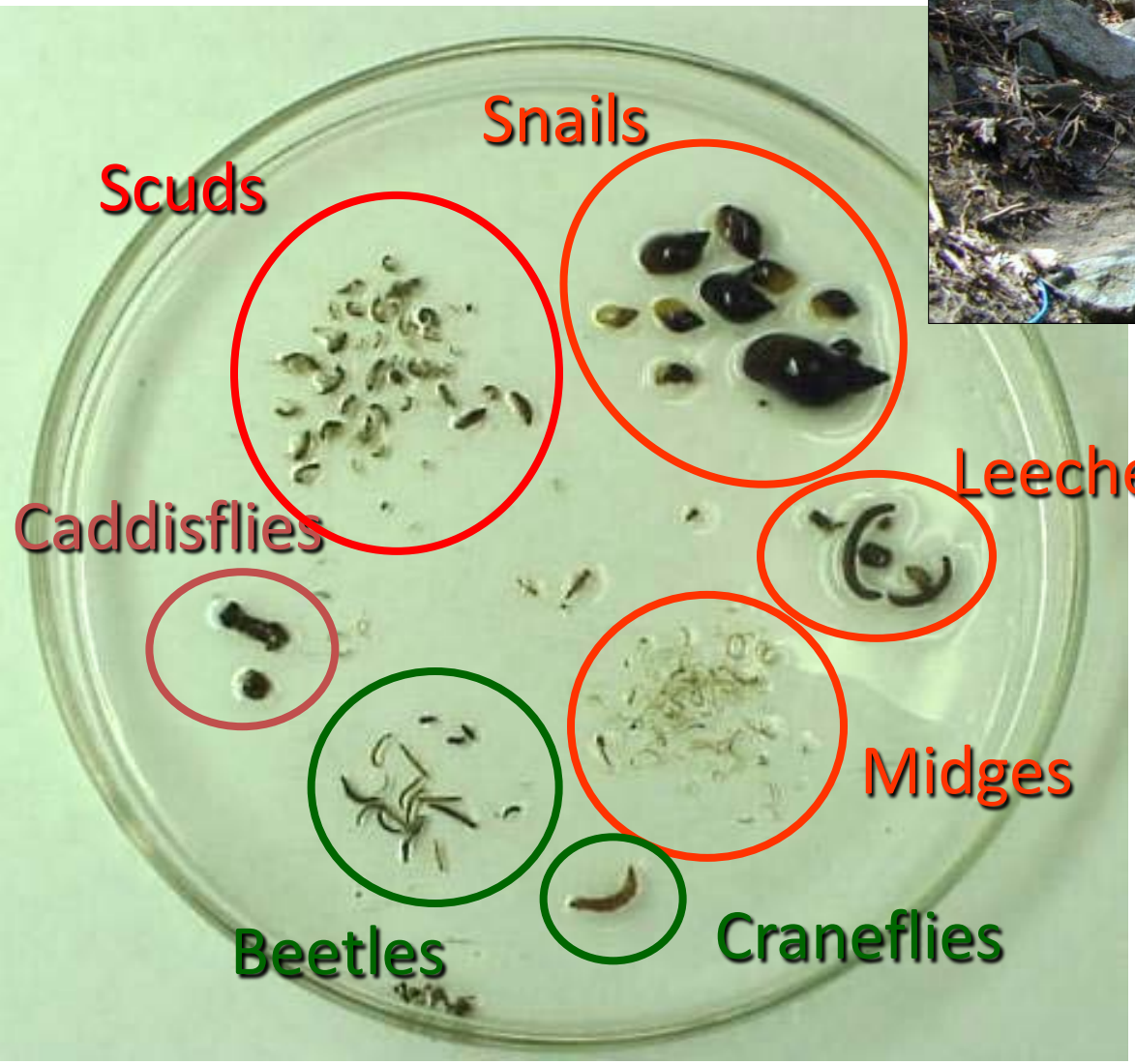
BCG Level 4


Caddisflies
Craneflies
Non-insects
Beetles
Midges
Stoneflies
Blackflies
Mayflies

Example BCG LEVEL 5-6

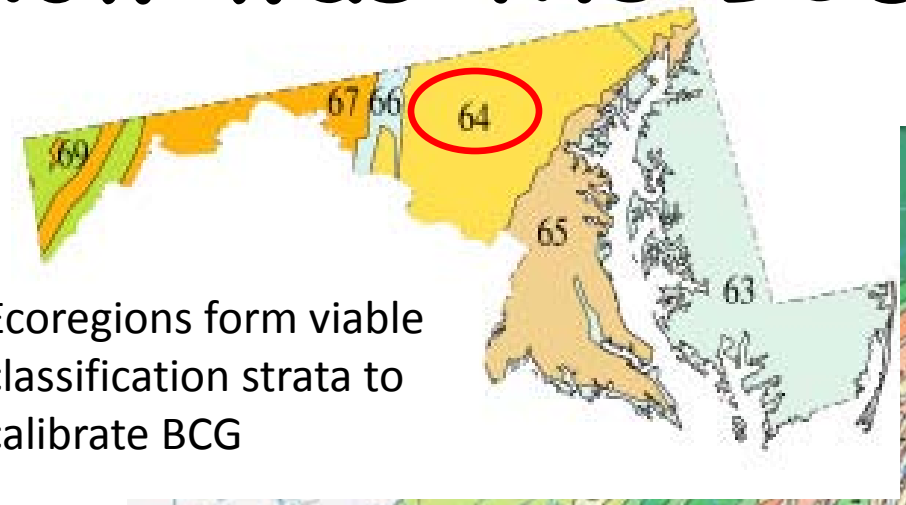


BCG Level 6



Drainage from a Shopping Mall Parking Lot

How was the BCG Developed?

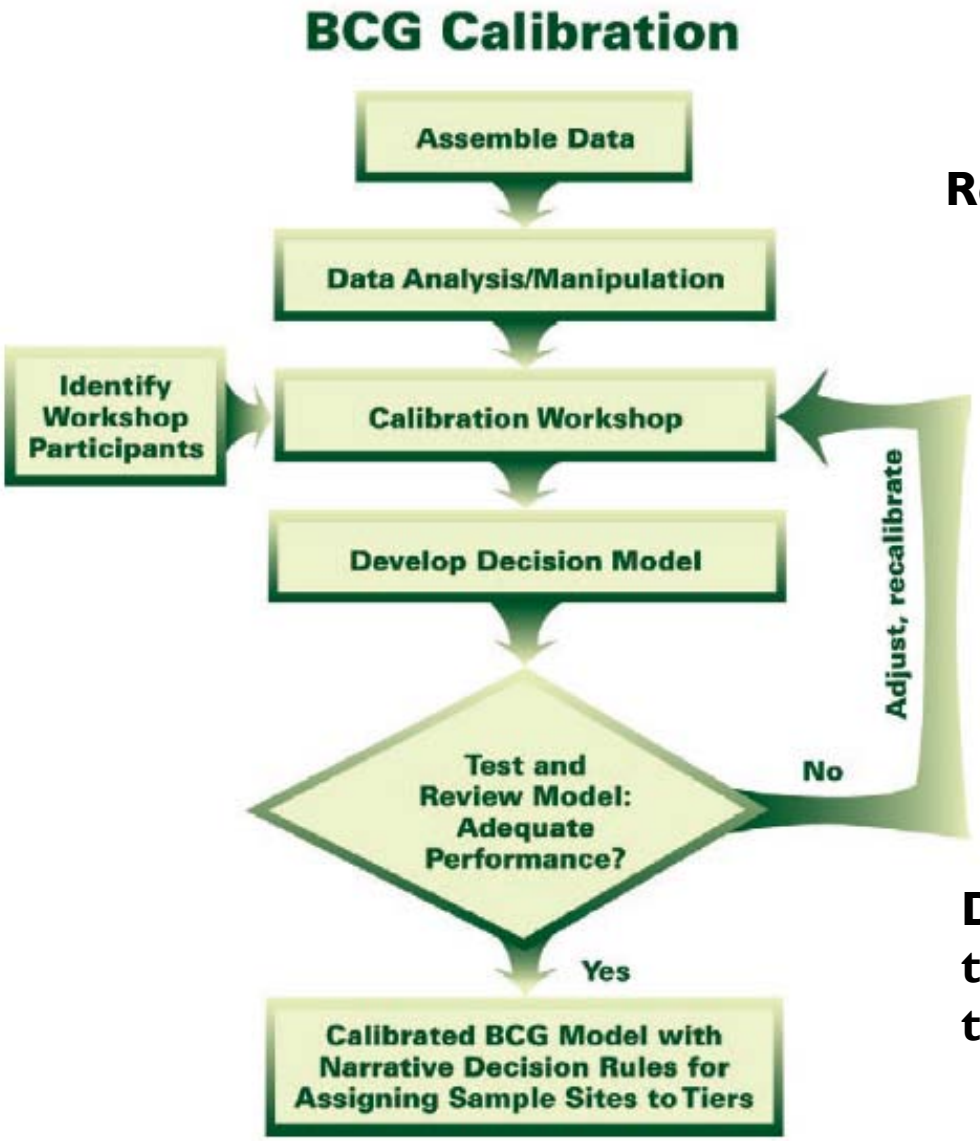


Ecoregions form viable classification strata to calibrate BCG

How was the BCG Developed?

Stream size or reach gradient-type stratification should also be considered in BCG development

How was the BCG Developed?



Review taxa and assign attributes

Review taxa lists & classify sites into BCG tiers

Determine rules that relate taxa occurrence & abundance, taxa attributes, & BCG tiers

How will we use the BCG?

Our Goals

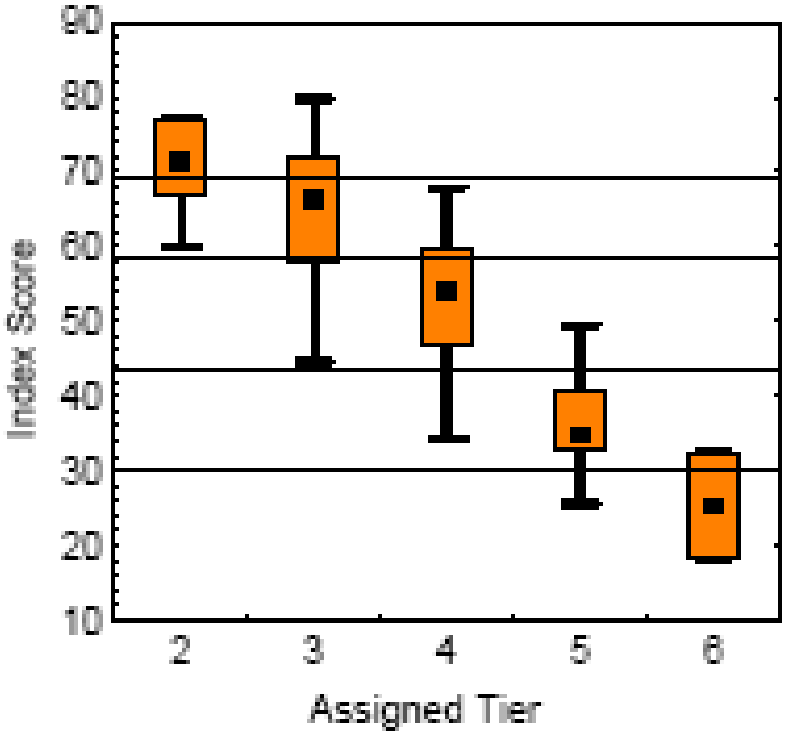
1. Better describe conditions within County streams
2. Show the degree of sensitivity within a watershed
3. Identify high quality waters that are at risk & require additional protections
4. Detect stream resource declines earlier to protect existing conditions
5. Indicate ecological improvement through restoration and/or improved stormwater management practices
6. Provide a measure of success for CIP and MS4 projects

How will we use the BCG?

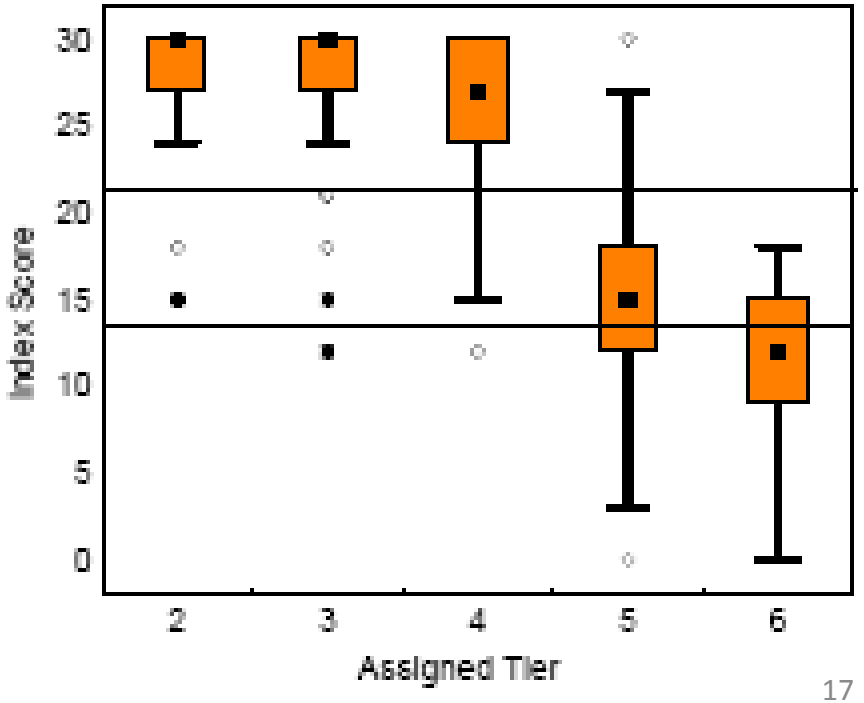
Goal # 1: Better describe conditions within County streams

- IBI categories too broad
- BCG has better narratives

IBI can distinguish BCG tiers



IBI cannot distinguish BCG tiers



How will we use the BCG?

Goal # 2: Show the degree of sensitivity within a watershed

- BCG levels consistently predict taxa richness of sensitive taxa
- Can be used to indicate sensitivity of watershed when applied to many sites

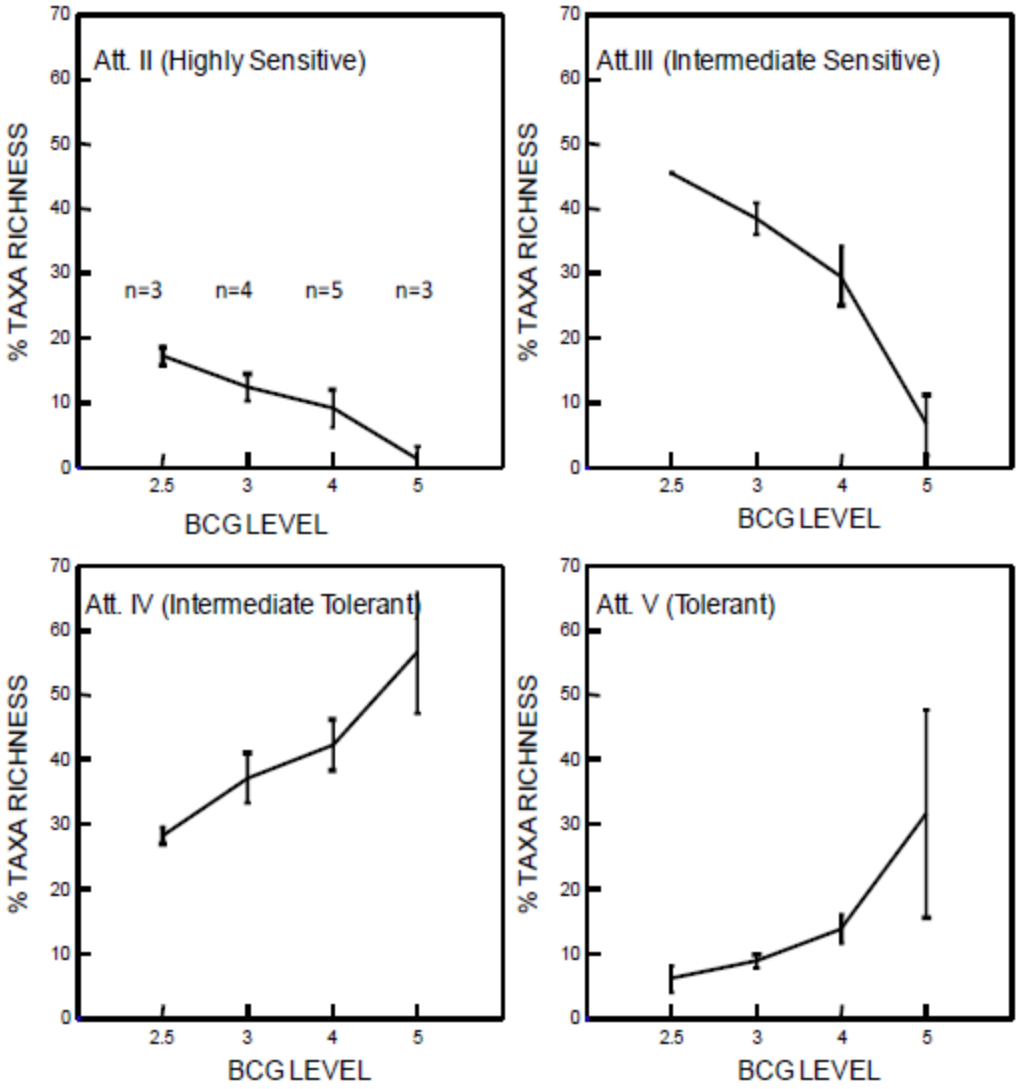
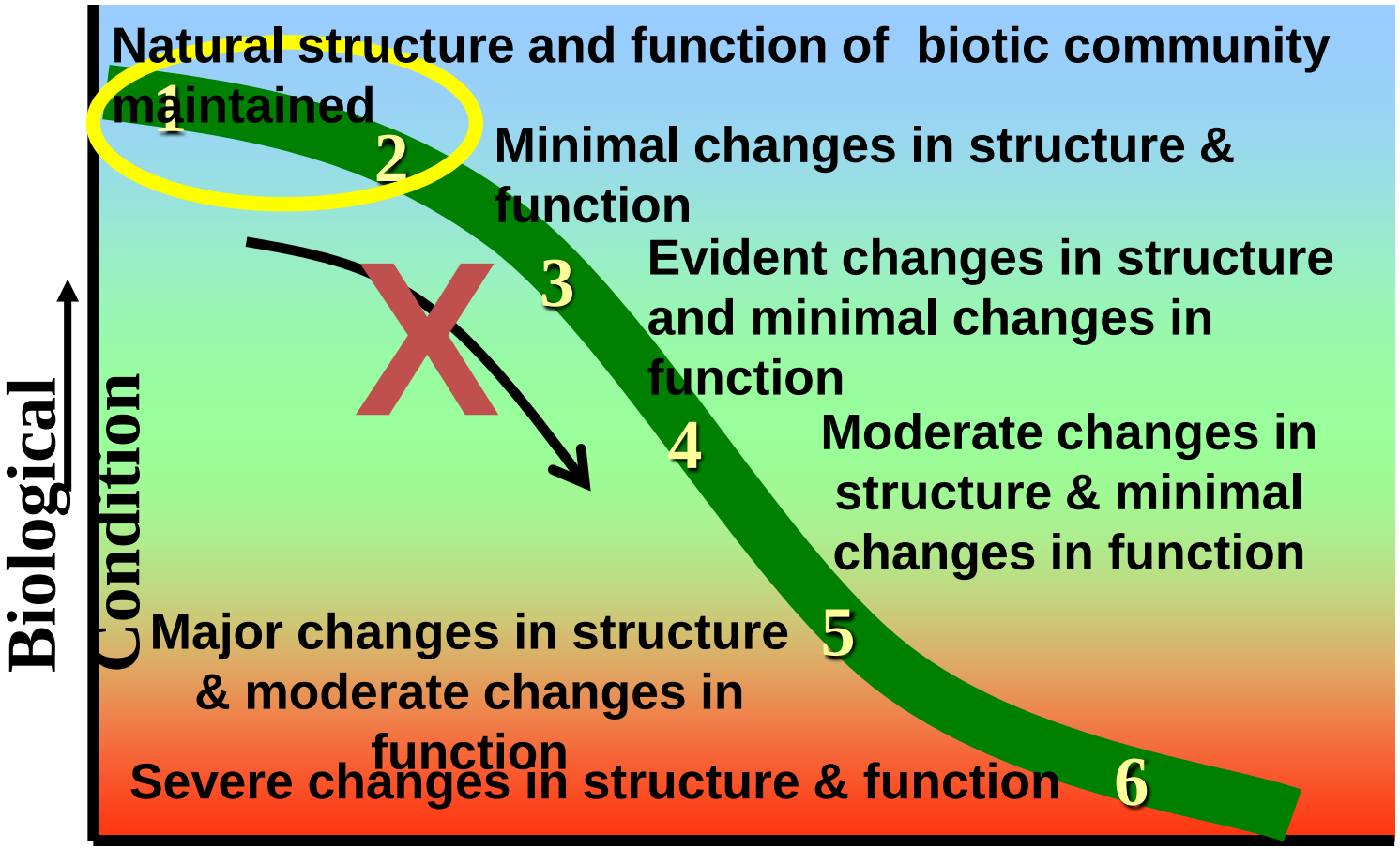


Figure 5. Range of taxon attribute values (proportion of richness) across BCG tiers

How will we use the BCG?

Goal # 3: Identify high quality waters that are at risk & require additional protections



How will we use the BCG?

Goal # 3: Identify high quality waters that are at risk & require additional protections

Example: PA Freestone Streams

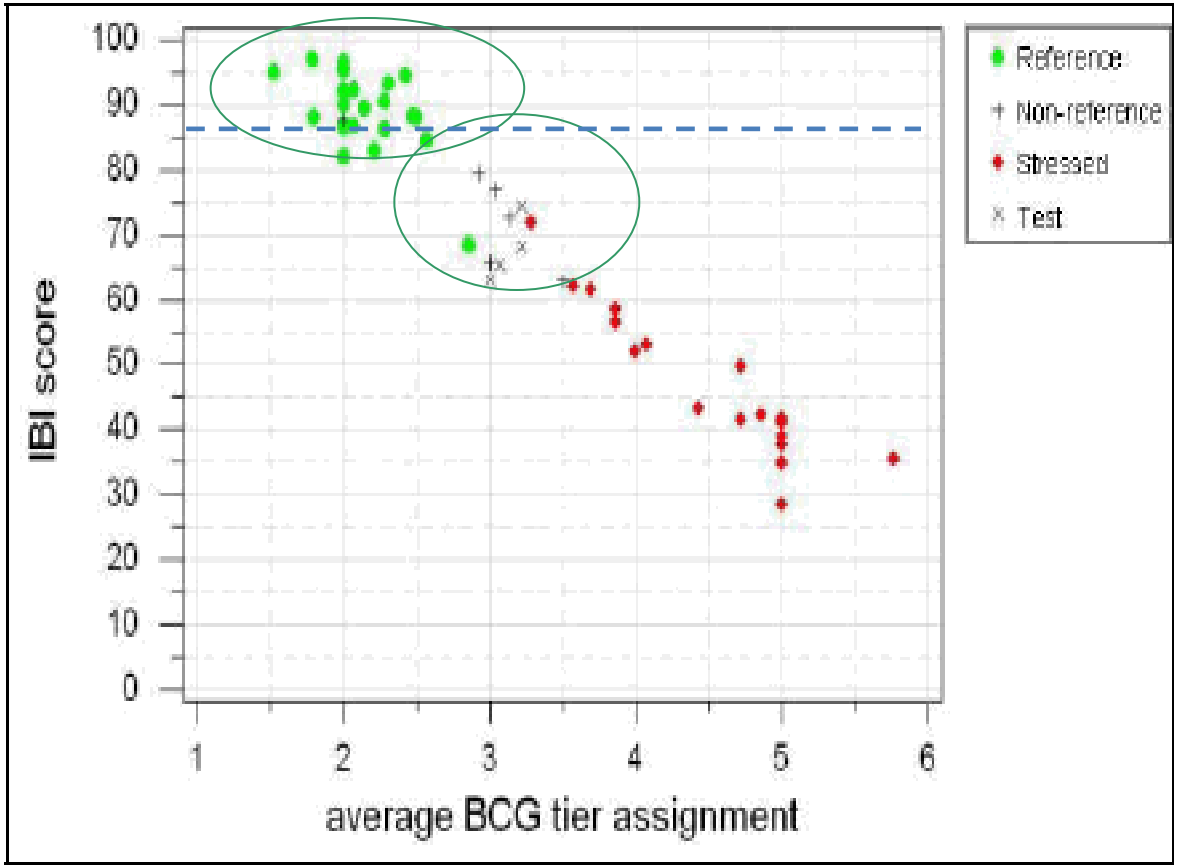


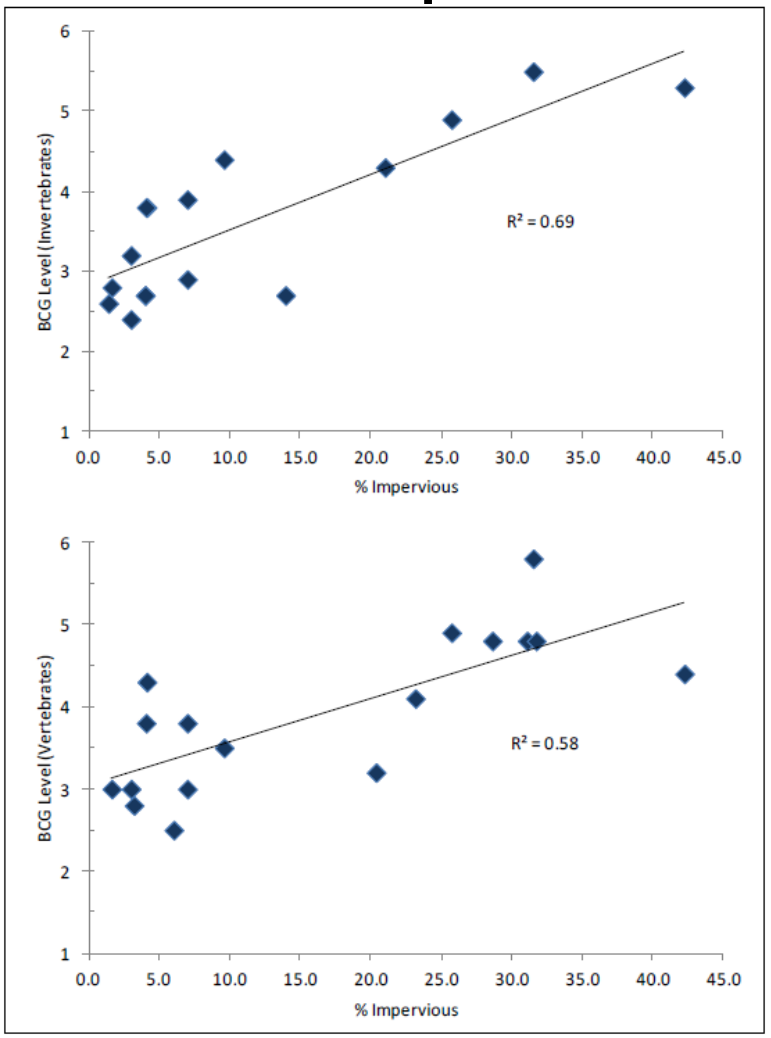
Figure 17. IBI scores for 53 samples plotted against the average assigned TALU workshop tier and coded according to sample type. Courtesy of B. Chalfont, PADEP

How will we use the BCG?

Goal # 4: Detect stream resource declines earlier to protect existing conditions

- Even very low levels of impervious show impacts to the BCG

BCG vs. Impervious



How will we use the BCG in the Future?

Goal # 5: Indicate ecological improvement through restoration and/or stormwater management practices

- Success showing before changes between pre and post construction declines in Montgomery County's Special Protection Areas

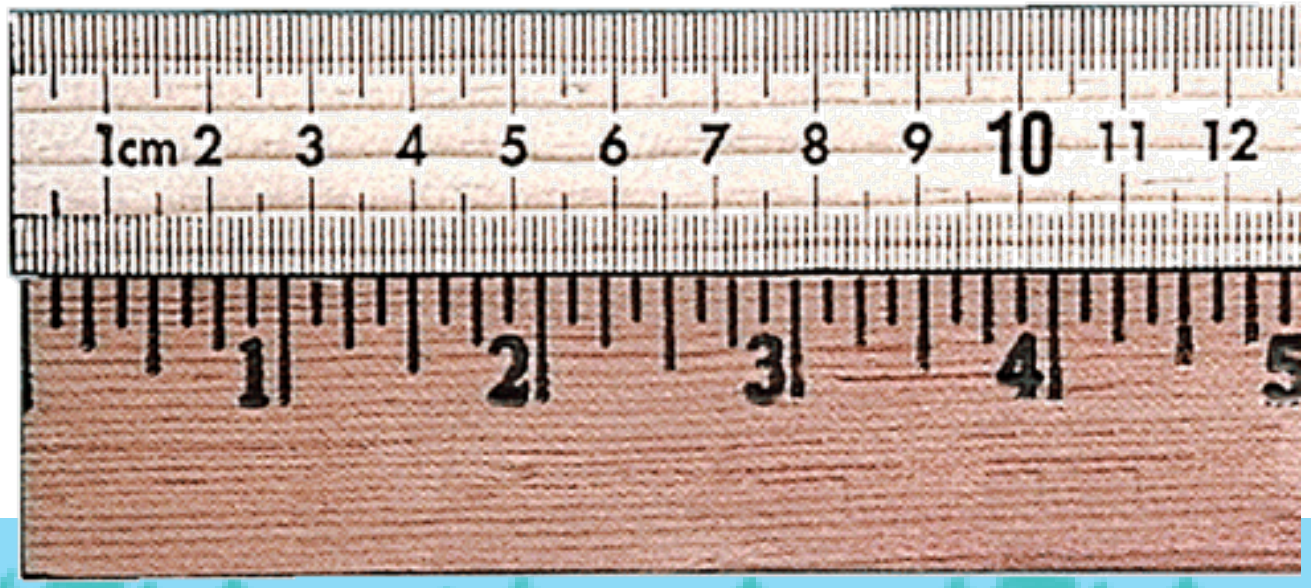
Goal # 6: Provide a measure of success for CIP and MS4 projects

- Are we getting our money's worth?

How do BCG & IBI compare?

BCG

IBI



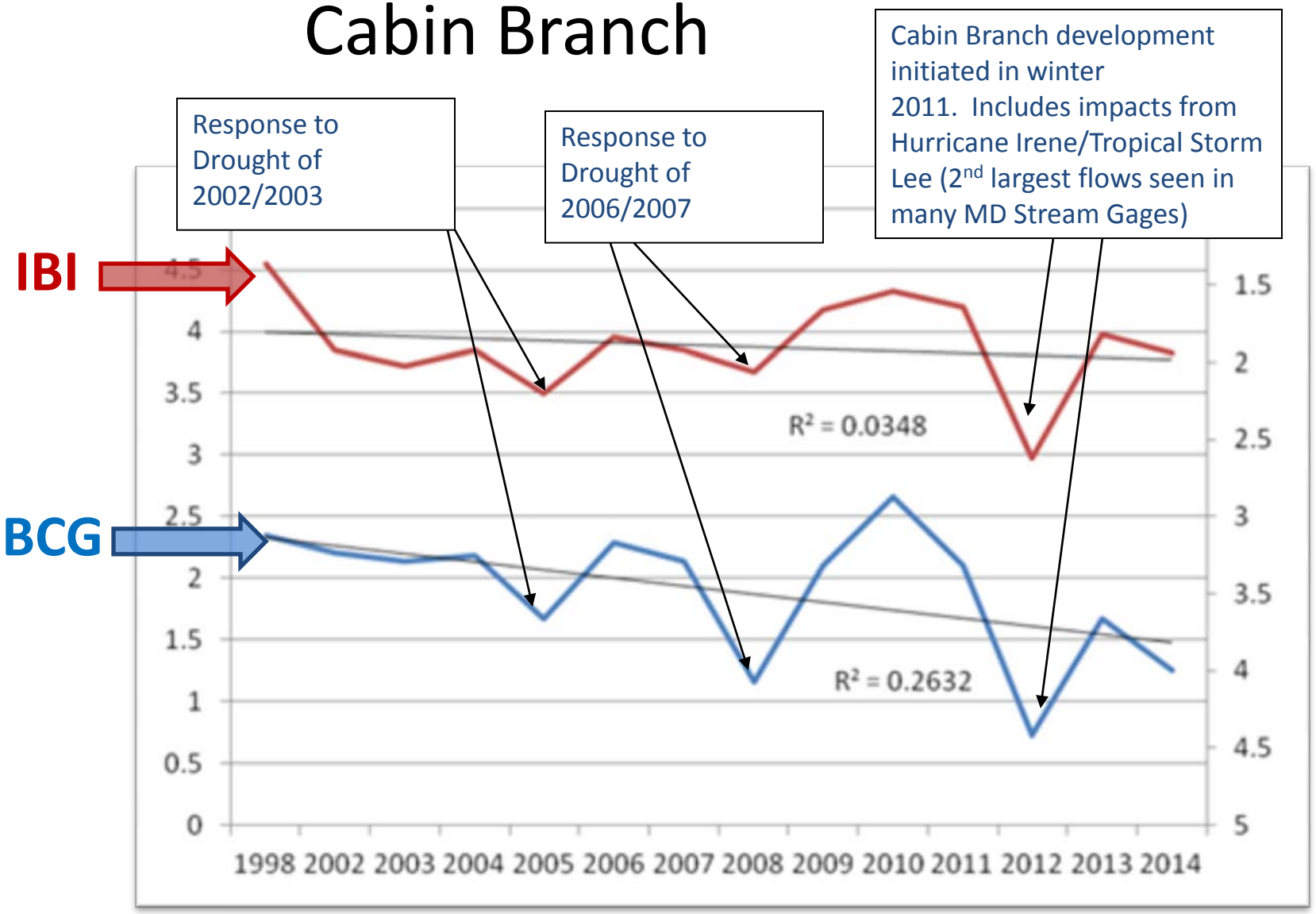
Healthy Stream

How do BCG & IBI compare?

- BCG results are very similar to IBI
- BCG appears to better characterize streams with larger drainage areas
- Plots trends more confidently
- Finer scale, but less noise in results
- Shows more strongly that developed sites are less resilient to recover from major impacts

How do BCG & IBI compare?

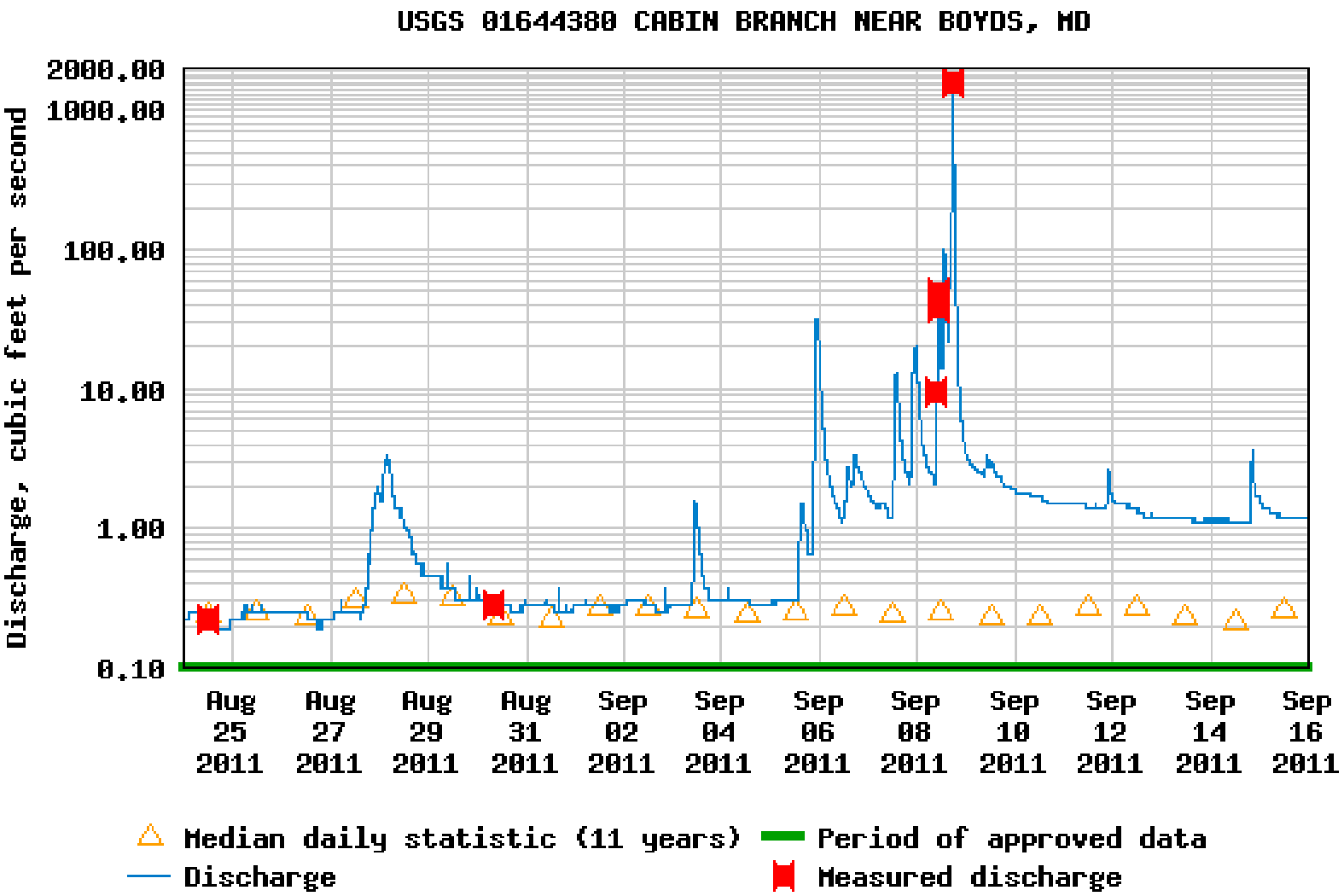
Cabin Branch



How do BCG & IBI compare?

Cabin Branch

Hurricane Irene/Tropical Storm Lee

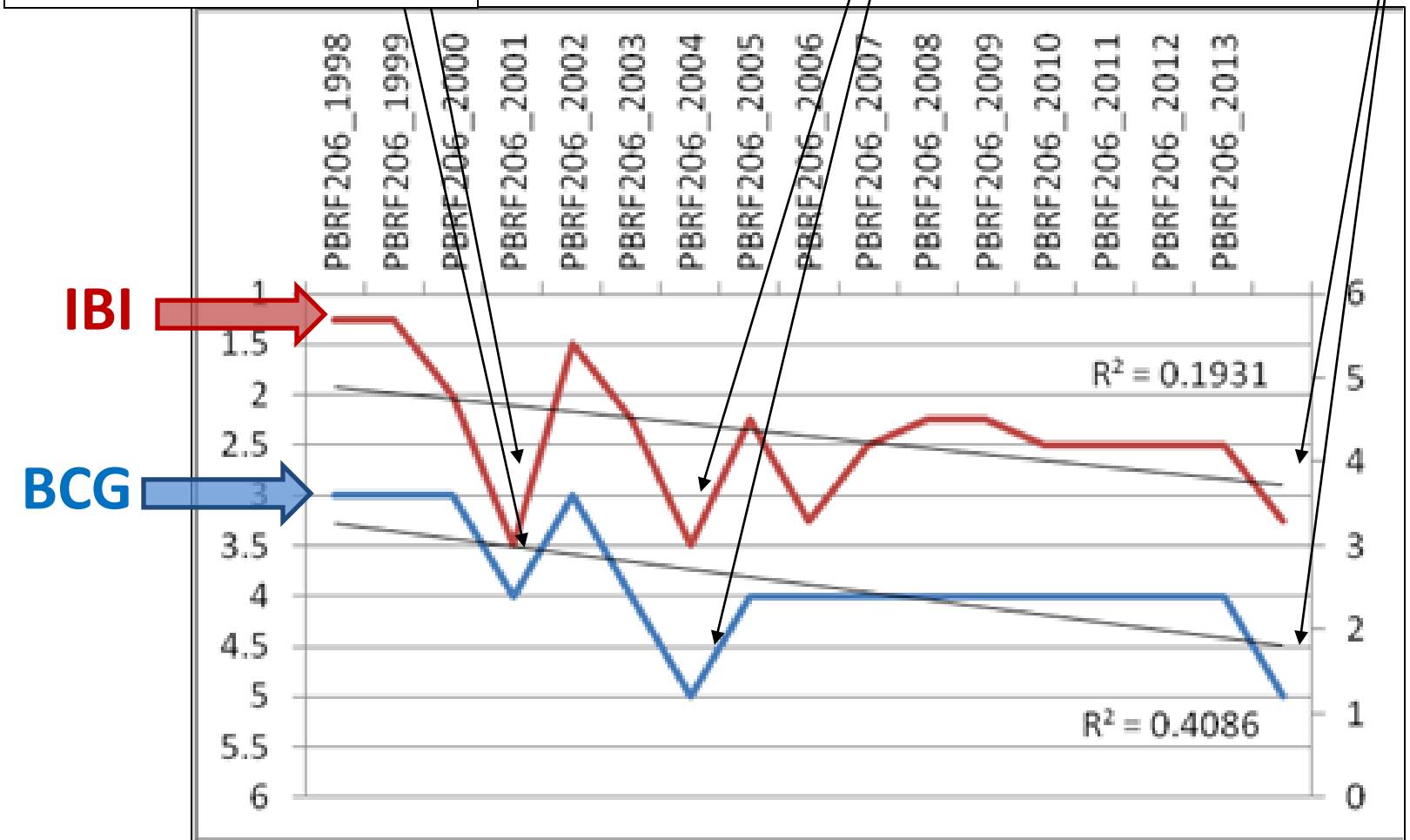


How do BCG & IBI compare?

Decline after developments initiate: Hunt/Lion Den Property, Hunt/Miles Property (2 largest properties to be developed in this drainage area)

Decline after several developments initiate: Allnutt/Peach Orchard Estates, Briar Cliff Manor West, Cedar Ridge Community Church Includes drought conditions of the early 2000s.

Large debris dam formed, degrading upstream habitat and serving as a fish blockage.



Right Fork Paint Branch

Conclusions

- Another tool for the tool box

- Better communication tool

- Has limitations to consider
- Scientifically robust and well documented

Questions?

MORE INFO

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